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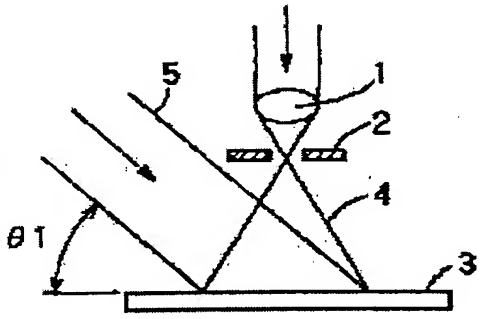
(71)Applicant : STANLEY ELECTRIC CO LTD
(72)Inventor : TOKO YASUO
IWAKURA YASUSHI
UI KAZUHISA
HIRAMOTO HIROYUKI

(54) PRINTER HEAD AND ITS MANUFACTURING METHOD

(57)Abstract:
PROBLEM TO BE SOLVED: To reduce costs, enable miniaturization and obtain a good distribution state of luminous intensity while hardly losing a quantity of light in an LED printer head for exposing a photoreceptor, etc.
SOLUTION: A diffraction optical element 3 is manufactured with the use of a laser light having a wavelength equal to or within ±10 nm of a maximum peak wavelength of an LED as a light emitting element. At this time, a laser luminous flux spreading as a reference light 4 and a laser beam flux having parallel characteristics as an object light 5 are applied to the film. The film- shaped diffraction optical element 3 is attached to a body of the head.



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CLAIMS

[Claim(s)]

[Claim 1] The printer head characterized by being the printer head exposed to a photo conductor, having a light emitting device and the diffracted-light study component arranged between this light emitting device and said photo conductor, and having arranged said diffracted-light study component in the location of a predetermined distance from the light-emitting part of said light emitting device.

[Claim 2] The printer head according to claim 1 characterized by carrying a diffracted-light study component on the substrate which mounted the light emitting device.

[Claim 3] A diffracted-light study component is a printer head according to claim 1 or 2 characterized by making the light from a light emitting device refracted, and making a photo conductor irradiate.

[Claim 4] There is no claim 1 characterized by having irradiated the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has parallelism as a body light, respectively, and producing it, and a diffracted-light study component is the printer head of a publication 3 either.

[Claim 5] There is no claim 1 characterized by having irradiated the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has breadth slightly as a body light, respectively, and producing it, and a diffracted-light study component is the printer head of a publication 3 either.

[Claim 6] For a diffracted-light study component, there is no claim 1 characterized by having irradiated the laser beam bundle with breadth irradiating the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has parallelism as a body light, respectively, and predetermined [as a reference beam], and the laser beam bundle which has breadth slightly as a body light, respectively, and producing, and a periphery is [a center section] the printer head of a publication 3 either.

[Claim 7] There is no claim 4 characterized by being the flux of light approximated to the luminescence flux of light of a light emitting device, and the laser beam bundle with the predetermined breadth used as a reference beam is the printer head of a publication 6 either.

[Claim 8] There is no claim 4 characterized by being the wavelength of less than **10nm of the maximum peak wavelength of the luminescence flux of light of a light emitting device, and the wavelength of the laser beam bundle used for production of a diffracted-light study component is the printer head of a publication 7 either.

[Claim 9] There is no claim 1 characterized by discovering diffractive by transparency of the flux of light

to this optical element, and a diffracted-light study component is the printer head of a publication 8 either.
[Claim 10] There is no claim 1 characterized by discovering diffractive depending on any of the combination of the refractive-index modulated structures and thickness modulated structures which this optical element has, and both those modulated structures they are, and a diffracted-light study component is the printer head of a publication 8 either.
[Claim 11] There is no claim 1 characterized by consisting of a transmission hologram, and a diffracted-light study component is the printer head of a publication 10 either.
[Claim 12] There is no claim 1 characterized by consisting of a volume hologram, and a diffracted-light study component is the printer head of a publication 10 either.
[Claim 13] The manufacture approach of the printer head which is the manufacture approach of the printer head exposed to a photo conductor, and is characterized by carrying out diffracted-light study component arrangement in the location of a predetermined distance from the light-emitting part of said light emitting device between a light emitting device and said photo conductor.
[Claim 14] The manufacture approach of the printer head according to claim 13 characterized by making it carry a diffracted-light study component on the substrate which mounted the light emitting device.
[Claim 15] A diffracted-light study component is the manufacture approach of the printer head according to claim 13 or 14 characterized by having arranged so that a photo conductor may be made to irradiate in the condition of having made the light from a light emitting device refracted.
[Claim 16] There is no claim 13 characterized by irradiating the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has parallelism as a body light, respectively, and producing it, and a diffracted-light study component is the manufacture approach of the printer head a publication 15 either.
[Claim 17] There is no claim 13 characterized by irradiating the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has breadth slightly as a body light, respectively, and producing it, and a diffracted-light study component is the manufacture approach of the printer head a publication 15 either.
[Claim 18] For a diffracted-light study component, there is no claim 13 characterized by irradiating a laser beam bundle with breadth irradiating the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has parallelism as a body light, respectively, and predetermined [as a reference beam], and the laser beam bundle which has breadth slightly as a body light, respectively, and making it produce, and a periphery is [a center section] the manufacture approach of the printer head a publication 15 either.
[Claim 19] There is no claim 16 characterized by things having made it be the flux of light approximated to the luminescence flux of light of a light emitting device, and the laser beam bundle with the predetermined breadth used as a reference beam is the manufacture approach of the printer head a publication 18 either.
[Claim 20] There is no claim 16 characterized by things having made it be less than **10nm in wavelength of the maximum peak wavelength of the luminescence flux of light of a light emitting device, and the wavelength of the laser beam bundle used for production of a diffracted-light study component is the manufacture approach of the printer head a publication 19 either.
[Claim 21] There is no claim 13 characterized by discovering diffractive by transparency of the flux of light to this optical element, and a diffracted-light study component is the manufacture approach of the

printer head a publication 20 either.

[Claim 22] There is no claim 13 characterized by discovering diffractive depending on any of the combination of the refractive-index modulated structures and thickness modulated structures which this optical element has, and both those modulated structures they are, and a diffracted-light study component is the manufacture approach of the printer head a publication 20 either.

[Claim 23] There is no claim 13 characterized by making it produce from a transmission hologram, and a diffracted-light study component is the manufacture approach of the printer head a publication 22 either.

[Claim 24] There is no claim 13 characterized by making it produce from a volume hologram, and a diffracted-light study component is the manufacture approach of the printer head a publication 22 either.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the printer head exposed to a photo conductor, and its manufacture approach.

[0002]

[Description of the Prior Art] In the printer of an electrophotography method etc., the LED printer head (LPH) which used the selfoc lens (SLA) is known as a means write-in [optical] exposed to a photo conductor. This LED printer head arranges a selfoc lens to the front-face side of LED which is the luminescence light source, and it is made to serve as luminous intensity distribution to which the light from LED was suitable for the writing to a photo conductor.

[0003]

[Problem(s) to be Solved by the Invention] By the way, while becoming expensive since the selfoc lens was used if it was in the above conventional LED printer heads, there was a trouble that the quantity of light decreased remarkably (it becomes about 5 - 10%), by letting a selfoc lens pass.

[0004] Furthermore, while MTF (modulation transfer function) of a selfoc lens was bad and did not turn to high resolution, dispersion was in the property of a selfoc lens and there was a trouble that the homogeneity of a light beam was inferior.

[0005] Moreover, although there is also an approach using a micro lens with a geometric configuration, it is difficult to perform sufficient optical control to a required image formation margin in this case. Therefore, the effectiveness of quantity of light buildup has indispensable concomitant use of the selfoc lens of a certain thing, and leads to a cost rise.

[0006] This invention does not almost have the loss of the quantity of light, and aims at offering the printer head from which a good luminous-intensity-distribution condition is acquired, and its manufacture approach while it was made in view of the above troubles and can attain reduction and a miniaturization of cost.

[0007]

[Means for Solving the Problem] The printer head concerning this invention and its manufacture approach are constituted as follows.

[0008] (1) It was the printer head exposed to a photo conductor, and it has a light emitting device and the diffracted-light study component arranged between this light emitting device and said photo conductor, and said diffracted-light study component has been arranged in the location of a predetermined distance from the light-emitting part of said light emitting device.

[0009] (2) In the above (1), the diffracted-light study component was carried on the substrate which mounted the light emitting device.

[0010] (3) A diffracted-light study component makes the light from a light emitting device refracted, and it was made to make it irradiate a photo conductor in the above (1) or (2).

[0011] (4) The above (1) thru/or (3) Setting [they to be / any], the diffracted-light study component irradiated the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has parallelism as a body light, respectively, and produced it.

[0012] (5) The above (1) thru/or (3) Setting [they to be / any], the diffracted-light study component irradiated the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has breadth slightly as a body light, respectively, and produced it.

[0013] (6) The above (1) thru/or (3) Setting [they to be / any], as a reference beam, the laser beam bundle with predetermined breadth and the laser beam bundle which has parallelism as a body light were irradiated, respectively, the diffracted-light study component irradiated the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has breadth slightly as a body light, respectively, and the center section produced [the periphery] it.

[0014] (7) The above (4) thru/or (6) It was made for the laser beam bundle with the predetermined breadth which sets they to be [any] and is used as a reference beam to be the flux of light approximated to the luminescence flux of light of a light emitting device.

[0015] (8) The above (4) thru/or (7) It was made for the wavelength of the laser beam bundle which sets they to be [any] and is used for production of a diffracted-light study component to be less than **10nm in wavelength of the maximum peak wavelength of the luminescence flux of light of a light emitting device.

[0016] (9) The above (1) thru/or (8) It sets they to be [any] and was made for a diffracted-light study component to discover diffractive by transparency of the flux of light to this optical element.

[0017] (10) The above (1) thru/or (8) It sets they to be [any] and was made for a diffracted-light study component to discover diffractive by any of the combination of the refractive-index modulated structures and thickness modulated structures which this optical element has, and both those modulated structures.

[0018] (11) The above (1) thru/or (10) It set they to be [any] and the diffracted-light study component was produced from the transmission hologram.

[0019] (12) The above (1) thru/or (10) It set they to be [any] and the diffracted-light study component was produced from the volume hologram.

[0020] (13) It is the manufacture approach of the printer head exposed to a photo conductor, and was made to carry out diffracted-light study component arrangement in the location of a predetermined distance from the light-emitting part of said light emitting device between a light emitting device and said photo conductor.

[0021] (14) It was made to carry a diffracted-light study component in the above (13) on the substrate which mounted the light emitting device.

[0022] (15) In the above (13) or (14), the diffracted-light study component has been arranged so that a

photo conductor may be made to irradiate in the condition of having made the light from a light emitting device refracted.

[0023] (16) The above (11) thru/or (13) Setting [they to be / any], a diffracted-light study component irradiates the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has parallelism as a body light, respectively, and produced it.

[0024] (17) The above (13) thru/or (15) Setting [they to be / any], a diffracted-light study component irradiates the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has breadth slightly as a body light, respectively, and produced it.

[0025] (18) The above (13) thru/or (15) It sets they to be [any], and as a reference beam, the laser beam bundle with predetermined breadth and the laser beam bundle which has parallelism as a body light were irradiated, respectively, and a periphery irradiates the laser beam bundle which has predetermined breadth as a reference beam, and the laser beam bundle which has breadth slightly as a body light, respectively, and, as for the diffracted-light study component, produced it, as for the center section.

[0026] (19) The above (16) thru/or (18) It was made for the laser beam bundle with the predetermined breadth which sets they to be [any] and is used as a reference beam to be the flux of light approximated to the luminescence flux of light of a light emitting device.

[0027] (20) The above (16) thru/or (19) It was made for the wavelength of the laser beam bundle which sets they to be [any] and is used for production of a diffracted-light study component to be less than **10nm in wavelength of the maximum peak wavelength of the luminescence flux of light of a light emitting device.

[0028] (21) The above (13) thru/or (20) It sets they to be [any] and was made for a diffracted-light study component to discover diffractive by transparency of the flux of light to this optical element.

[0029] (22) The above (13) thru/or (20) It sets they to be [any] and was made for a diffracted-light study component to discover diffractive by any of the combination of the refractive-index modulated structures and thickness modulated structures which this optical element has, and both those modulated structures.

[0030] (23) The above (13) thru/or (22) It sets they to be [any] and the diffracted-light study component was produced from the transmission hologram.

[0031] (24) The above (13) thru/or (22) It sets they to be [any] and the diffracted-light study component was produced from the volume hologram.

[0032]

[Embodiment of the Invention] Hereafter, the example of this invention is explained about a drawing.

[0033] This example constitutes the LED printer head which has arranged the diffracted-light study component in a comparatively near distance in which a predetermined distance and the luminescence flux of light of LED which adjoin here do not interfere from this light-emitting part to the luminescence flux of light with the breadth from the light-emitting part of LED which is the above-mentioned luminescence light source.

[0034] Moreover, the above-mentioned diffracted-light study component is used as the component which controls the luminous-intensity-distribution condition of the luminescence flux of light of LED in the parallel flux of light or the condition near it, or is controlled not to spread to the magnitude to which the luminescence flux of light of LED which the diameter of a spot of the luminescence flux of light adjoins within a certain fixed distance interferes in the luminous-intensity-distribution condition of the luminescence flux of light of LED.

[0035] (Example 1) Drawing 1 and drawing 2 are drawings showing the LED printer head by the example 1 and its manufacture approach of this invention, and the sectional view in which drawing 1 shows the situation of hologram production, and drawing 2 are the sectional views showing the situation of hologram playback. Moreover, (a) of drawing 2 is a side elevation, and (b) is a front view.

[0036] In drawing 1 and drawing 2 , a pinhole plate with [1 / condenser lens] a pinhole (1micrometerphi) in 2 and 3 are the reference beams and body light for hologram production in a diffracted-light study component (HOE), and 4 and 5, and the body light 5 is irradiated with an include angle theta 1. 6 is a head body, 7 is the middle class between the head body 6 and the diffracted-light study component 3, and it has become ITO, metal, the passivation film, an adhesive layer, etc. It is the playback light in which LED whose 8 is a light emitting device, and 9 have the luminescence light (flux of light) from the light-emitting part, and 10 has an include angle theta 1 and which is irradiated by the non-illustrated photo conductor. First, by the optical system shown in drawing 1 , it is the same as the maximum peak wavelength of LED8, or the diffracted-light study component 3 is produced using a laser beam with a wavelength of less than **10nm. A photosensitive monomer irradiates the laser beam bundle (2 flux of light) which has coherent nature from the same direction on the film (diffracted-light study component 3) by which coating is carried out in that case. Here, as a hologram ingredient used as the diffracted-light study component 3, Omnidex (E. I. du Pont de Nemours photopolymer) can be used, for example.

[0037] And the laser beam bundle (reference beam 4) which has breadth in the minute spot of the above-mentioned film, and the laser beam bundle (body light 5) which has parallelism are irradiated. He is trying for the optical intensity ratio of the reference beam 4 of this minute spot and the body light 5 to become 2:1 to about 10:1. In addition, the condition of a laser beam bundle with breadth here is set as the condition near the condition of the luminescence flux of light of LED8.

[0038] Next, as shown in drawing 2 , the film-like diffracted-light study component 3 is stuck on the head body 6. Although the line for wire bonding is on the head body 6 at this time, it is necessary to stick so that a it top may be avoided. Or the head body 6 may be produced so that it may come to the location where wire bonding separated from a part for a light-emitting part. Moreover, the head body of wire-bonding needlessness may be used by patterning etc.

[0039] And although the luminescence flux of light of LED8 will spread to some extent while ITO, metal, the passivation film, etc. are on the light-emitting part of LED8, and an adhesive layer is under the diffracted-light study component 3 and penetrating these interlayers 7, it is necessary to make it the luminescence flux of lights of adjoining LED8 not overlap, as the spreading magnitude shows (b) of drawing 2 . For this reason, as for an interlayer 7, it is desirable to make it as thin as possible.

[0040] In the LED printer head constituted as mentioned above, since the flux of light which penetrates near and the diffracted-light study component 3 to the reference beam 4 which shows the luminescence flux of light by which outgoing radiation is carried out from LED8 shown in drawing 2 to drawing 1 is controlled by the condition near the body light 5, the luminous intensity distribution of the playback light 10 are carried out to the parallel flux of light refracted at the include angle theta 1. Therefore, the adjacent flux of light can lengthen distance x which spreads to the magnitude in which it interferes mutually.

[0041] It is difficult to reproduce the completely same flux of light as the luminescence flux of light of LED8 as a reference beam 4, since the light-emitting part of that the luminescence wavelength of LED8 has distribution to some extent actually although the above-mentioned distance x should become infinity

since playback light 10 is ideally made to a perfect parallel light here, and LED8 has the magnitude of finite, and distance x serves as a value of finite. In the case of distance [magnitude the angle of 2.2 microns of a light-emitting part, and / 19-micron] between light-emitting parts, as a result of actually producing, it was 1mm of distance x abbreviation, having used resolution as 1200dpi.

[0042] Thus, since the good luminous-intensity-distribution condition that the flux of lights of LED8 which a focal distance adjoins for a long time do not overlap can be acquired without using a selfoc lens expensive in this example, reduction and a miniaturization of cost can be attained. Moreover, since there is almost no loss of the quantity of light, while being able to use LED of low brightness, burning time amount can be shortened and generation of heat can be suppressed. Furthermore, since a selfoc lens and a micro lens become unnecessary, the whole printer can be miniaturized.

[0043] (Example 2) Drawing 3 and drawing 4 are drawings showing the LED printer head by the example 2 and its manufacture approach of this invention, and the sectional view in which (a) of drawing 3 and (b) show the situation of hologram production, and drawing 4 are the sectional views showing the situation of hologram playback. Moreover, the same sign as drawing 1 and drawing 2 shows the same component.

[0044] In drawing 3 and drawing 4 , a pinhole plate with [1 / condenser lens] a pinhole (1micrometerphi) in 2, the reference beam for hologram production in 4, and 5a and 5b are the body light for hologram production, and body light 5a is irradiated with an include angle theta 2. 6 is a head body, 7 is the middle class between the head body 6 and the diffracted-light study component 3, and it has become ITO, metal, the passivation film, an adhesive layer, etc. As for a diffracted-light study component and 14, the protection-from-light nature matter, and 15 and 16 are [a pinhole plate with / 11 / the playback light in which LED whose 8 is a light emitting device, and 9 have the luminescence light (flux of light) from the light-emitting part, and 10 has an include angle theta 2 and which is irradiated by the non-illustrated photo conductor, and / condenser lens / a pinhole in 12 and 13] the 1st and the 2nd area.

[0045] First, by the optical system shown in drawing 3 , it is the same as the maximum peak wavelength of LED8, or the diffracted-light study component 13 is produced using a laser beam with a wavelength of less than **10nm. In that case, as shown in (a) of drawing 3 , a photosensitive monomer irradiates the laser beam bundle (2 flux of light) which has coherent nature from the same direction on the film (diffracted-light study component 13) by which coating is carried out. Here, as a hologram ingredient used as the diffracted-light study component 13, Omnidex (E. I. du Pont de Nemours photopolymer) can be used, for example.

[0046] And the laser beam bundle (reference beam 4) which has the breadth of the 1st area 15 comparable as the magnitude of a light-emitting part in the center section of the area used as the original spot section, and the laser beam bundle (body light 5a) which has parallelism are irradiated. He is trying for the optical intensity ratio of the reference beam 4 of this minute spot and body light 5a to become 2:1 to about 10:1. In addition, the condition of a laser beam bundle with breadth here is set as the condition near the condition of the luminescence flux of light of LED8.

[0047] Then, as shown in (b) of drawing 3 , the laser beam bundle (2 flux of light) which has coherent nature is again irradiated on the above-mentioned film (diffracted-light study component 13). In that case, the protection-from-light nature matter 14, such as a photo mask, is arranged on the 1st area 15 of the above, and a laser beam bundle (reference beam 4) with the breadth of the 2nd same area 16 as the original spot section and the laser beam bundle (body light 5b) which has breadth slightly are irradiated. He is trying for the optical intensity ratio of the reference beam 4 of this minute spot and body light 5b to

become 2:1 to about 10:1.

[0048] In addition, (a) of drawing 3 and the reference beam 4 of (b) of drawing 3 are taken as the luminous-intensity-distribution condition of having the same breadth. However, since (a) of drawing 3 differs from the magnitude of the area irradiated by (b) of drawing 3 , the distance between the diffracted-light study components 13 is changed and adjusted from a pinhole.

[0049] Next, as shown in drawing 4 , the film-like diffracted-light study component 13 is stuck on the head body 6. Although the line for wire bonding is on the head body 6 at this time, it is necessary to stick so that a it top may be avoided. Or the head body 6 may be produced so that it may come to the location where wire bonding separated from a part for a light-emitting part. Moreover, the head body of wire-bonding needlessness may be used by patterning etc.

[0050] And although the luminescence flux of light of LED8 will spread to some extent while ITO, metal, the passivation film, etc. are on the light-emitting part of LED8, and an adhesive layer is under the diffracted-light study component 3 and penetrating these interlayers 7, it is necessary to make it the luminescence flux of lights of adjoining LED8 not overlap, as the spreading magnitude shows (b) of above-mentioned drawing 2 . For this reason, as for an interlayer 7, it is desirable to make it as thin as possible.

[0051] Since the flux of light which penetrates near and the diffracted-light study component 13 to the reference beam 4 which shows the luminescence flux of light by which outgoing radiation is carried out in the LED printer head constituted as mentioned above from LED8 shown in drawing 4 to drawing 3 is controlled by the condition near the body light 5a and 5b, The luminous intensity distribution of the center section of the playback light 10 are carried out to the parallel flux of light refracted at the include angle theta 2, and although a periphery will be in the condition of condensing inside a little from a parallel condition, if the flux of light of a periphery is averaged, it will change luminous intensity distribution into the condition of having been refracted at the include angle theta 2.

[0052] Therefore, the wavelength distribution in the above-mentioned example 1 and the effect by the magnitude of a light-emitting part can be eased, and the flux of light which adjoins each other practically can lengthen further distance x which spreads to the magnitude in which it interferes mutually. In the case of distance [magnitude the angle of 1 micron of a light-emitting part, and / 10-micron] between light-emitting parts, as a result of actually producing, it was 2mm of distance x abbreviation, having used resolution as 2400dpi.

[0053] Thus, since the good luminous-intensity-distribution condition that the flux of lights of LED8 which a focal distance adjoins for a long time do not overlap can be acquired without using an expensive selfoc lens also in this example, while the same operation effectiveness as the above-mentioned example is acquired and being able to attain reduction and a miniaturization of cost, there is almost no loss of the quantity of light, and a good luminous-intensity-distribution condition is acquired.

[0054] In addition, although the laser beam was irradiated in 2 steps and the diffracted-light study component 13 was produced in the above-mentioned example 2 as shown in drawing 3 , a laser beam is irradiated only once by the optical system shown in (b) of drawing 3 , and the diffracted-light study component 13 may be produced. Even in this case, practical distance x can be made longer than an example 1 like the above.

[0055] Here, as a photosensitive ingredient, a photopolymer, a silver salt emulsion, thermo plastics, etc. can be used. Moreover, you may make it form a photosensitive monomer by the approach of carrying out

direct coatings (spin, various printings, a roll coat, a die coat, slit coat, etc.) of the ingredient on an LED substrate.

[0056] Moreover, as a light emitting device, organic [LED] and organic electroluminescence are sufficient and a surface emission-type laser is sufficient. Furthermore, although that from which wavelength differs may be used, the laser wavelength which produces a hologram in this case has the desirable wavelength near each luminescence wavelength. However, since it has the function in which wavelength controls somewhat the extent light from which it has also shifted, it is not the limitation when resolution is not so high.

[0057] Moreover, you may make it a diffracted-light study component discover diffractive by transparency of the flux of light to this optical element, and may make it discover diffractive depending on any of the combination of the refractive-index modulated structures and thickness modulated structures which this optical element has, and both those modulated structures they are.

[0058] And this diffracted-light study component is producible from a transmission hologram or a volume hologram.

[0059]

[Effect of the Invention] As explained above, while being able to attain reduction and a miniaturization of cost according to this invention, there is almost no loss of the quantity of light, and it is effective in a good luminous-intensity-distribution condition being acquired.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing showing the example 1 of this invention

[Drawing 2] Drawing showing the example 1 of this invention

[Drawing 3] Drawing showing the example 2 of this invention

[Drawing 4] Drawing showing the example 2 of this invention

[Description of Notations]

1 Condenser Lens

2 Pinhole Plate

3 Diffracted-Light Study Component

4 Reference Beam

5 Body Light

5a Body light

5b Body light

6 Head Body

7 Interlayer

8 LED

9 Luminescence Light

10 Playback Light

11 Condenser Lens

12 Pinhole Plate

13 Diffracted-Light Study Component

14 Protection-from-Light Nature Matter

15 Area

16 Area

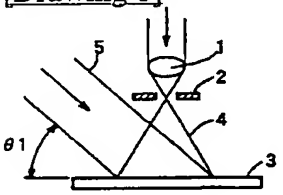
[Translation done.]

* NOTICES *

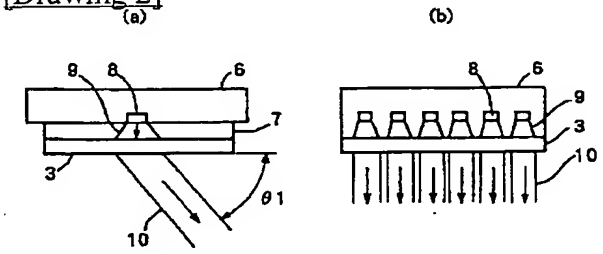
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

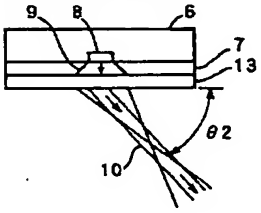
[Drawing 1]



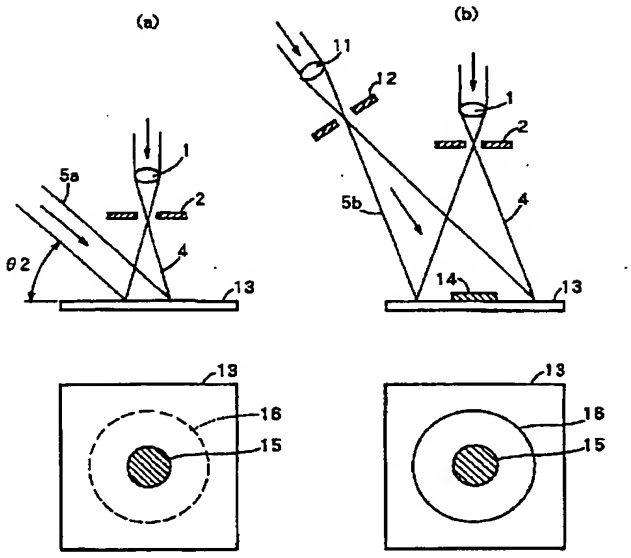
[Drawing 2]



[Drawing 4]



[Drawing 3]



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